

are emitted in excess; or if the heat is sufficiently intense to produce them largely, as in the melted metal, where the thin films of oxide on its surface glow with perfect whiteness, the metal itself must shine with bluish, or it may be with greenish-blue light, if the heat is only high enough to make the excess of green rays very strongly visible. If this should be, as I suppose, the real explanation of the very curious appearance of depth of a certain tint of colour, contrasting strongly in some parts of the melted stream by its greenish hue with the surrounding redder lights, according as the natural tinted appearance of the vivid metal is effaced or diluted by the floating films of white-hot oxides in lines and parts of the stream depending on the surface-flow, and suggesting in some degree the idea of a transparent cascade, and even from its colour of a waterfall, the process often repeated in large foundries of running gun-metal into large castings presents an instance of well-defined action of the law of exchanges which must be constantly witnessed and noted inquiringly by daily observers, and which certainly presents, if a different and more natural explanation can be given of its origin, to eyes unaccustomed and unprepared to receive it, a somewhat surprising and otherwise unaccountable appearance. In gun-metal, when the proportion of zinc introduced is very small, the coating of the melted surface by copper oxide is comparatively slow, and in melted brass it might not be possible, from the rapid oxidation of zinc upon the surface, successfully to observe the same phenomenon. In order to render melted copper fluid enough for casting, a small proportion of alloy sufficient to give it almost the colour of brass is required to be mixed with it, and large pourings of the pure metal cannot commonly be made; but perhaps in small castings of this metal, and probably also in those of gold, opportunities would present themselves similar to that which I have here attempted to describe, of verifying the same general law of radiation connecting together the qualities of luminosity and absorption in the surfaces of highly coloured metals.

Newcastle-on-Tyne, Sept. 20

A. S. HERSCHEL

Changes of Level in the Island of Savaii

WHILE feeling some diffidence about setting myself in opposition to so careful an observer as the Rev. S. J. Whitmee (NATURE vol. xii., p. 291), I cannot allow his statements in regard to changes of level in the island of Savaii, Samoan group, to pass altogether unchallenged. In the month of June 1874 I spent some weeks on the island, during which time I travelled around nearly the whole of it on foot. Though not a scientific observer, I was on the look-out for indications of change of level along the coast, and it is my decided opinion that such indications are quite as little apparent in Savaii as in Upolu. Mr. Whitmee, whom I had the pleasure of meeting on the island, directed my attention to what he believed to be a line of upheaved cliffs a couple of hundred yards back from the sea, near Tufu, on the south side of the island. On examining the place, after parting from Mr. Whitmee, I particularly observed that the floor of volcanic rock at the base of the cliffs bore exactly the appearance of lava that had cooled in the open air. The creases and ripples left on the surface of the lava in cooling were distinctly visible, which could not have been the case if the rock had ever been exposed to the action of the waves. No doubt was left on my mind that the floor of volcanic rock between the base of the cliffs and the sea was at one time on a level with the top of the cliffs, and that it had broken away and sunk several feet, from some cause which I do not attempt to explain.

I brought away the impression that Savaii was at one time much more fully supplied with barrier reefs than at present, and that recent lava-flows had extended the island out beyond the reef. So far as my observations extended, where reefs do exist they are terminated by points or capes of volcanic rock, looking as if the lava had overflowed and cut off the reef.

One circumstance almost, if not quite, fatal to the theory that Savaii has been upheaved in whole or in part in recent times, is that nowhere are there any signs of coral *in situ* above the sea-level. In this respect it is very different from the island of Rarotonga, in the Hervey group, which has most unquestionably been upheaved several feet, at least on the south side. There the barrier reef is altogether out of water, and what was once the enclosed lagoon is in some places dry land.

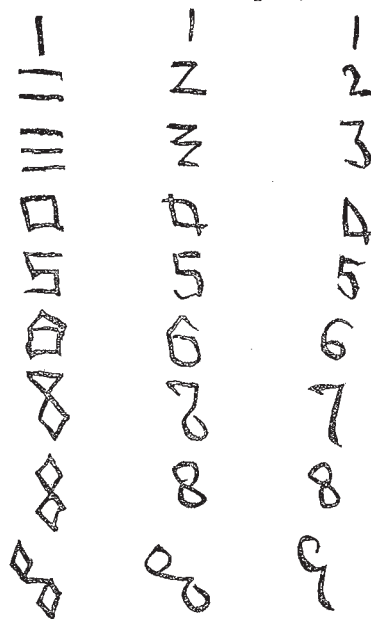
In regard to the absence of barrier reefs in front of lava-flows, I venture to suggest that it is more likely to be caused by the depth of the water or by the recency of the lava-flow than by any effect of existing submarine volcanic action on the coral insect.

San Francisco, Sept. 7

RICHARD WEBB

Origin of the Numerals

HAVING never met with any explanation of the origin of the numerals, or rather of the figures symbolising them, perhaps I am right in supposing that nothing satisfactory is known of it. In that case the following may be interesting to your readers. The first column contains the original figures, each containing as



many lines as the number which it is intended to represent. The other columns show the transitions likely to result from quick writing.

W. DONISTHORPE

17, Porchester Terrace, W.

Pugnacity of Rabbits and Hares

I HAVE occasion just now to keep over thirty Himalayan rabbits in an outhouse. A short time ago it was observed that some of these rabbits had been attacked and slightly bitten by rats. Next day the person who feeds the rabbits observed, upon entering the outhouse, that nearly all the inmates were congregated in one corner, and upon going to ascertain the cause, found one rat dead and another so much injured that it could scarcely run. Both rats were of an unusually large size, and their bodies were much mangled by the rabbits' teeth.

I never before knew that domestic rabbits would fight with any carnivorous antagonist. That wild rabbits never do so I infer from having several times seen ferrets turn out, from the most crowded burrow in a warren, young stoats and weasels not more than four inches long.

It is evident that the show-fight instinct cannot have been developed in Himalayan rabbits by means of natural selection, but it is no less evident that if it ever arose in wild rabbits it would be preserved and intensified by such means. And in this connection I should like to ask any of your readers who may be able to supply information upon the point, whether there is any difference between the hares of Great Britain and those of the Continent with regard to pugnacity. I have been assured by Germans that in their country a hare will fight a good-sized dog rather than run, and that it is dangerous to handle a wounded individual. I do not know, however, whether or not to trust these statements, and as there appear to be very few examples of local varieties of instincts, it is desirable that anyone who can should either confirm or deny this curious instance.

Dunskait, Ross-shire

GEORGE J. ROMANES

OUR ASTRONOMICAL COLUMN

"35 CAMELOPARDI," B.A.C. 1924.—The principal component of this double star is not included either amongst the certain or suspected variables in Professor Schönfeld's last catalogue, but there would appear to be sufficient evidence of change to justify its being placed in the former class. Variability was suspected by the Baron Dembowski from his own estimates of magnitude 1865-

68 (A.N. 1810), and the following are almost decisive of fluctuation through about two magnitudes, so that at times the star will be visible to the naked eye, and at others fairly beyond unassisted vision.

As lower estimates we have Argelander 1842 January 25—8 mag., and Radcliffe Obs. 1870 February 22—7·5 mag.

As higher estimates we find, Flamsteed, 1696 January—5½, Lalande (in Fedorenko's Catalogue), 1790 February—5·6, Dembowsky, 1868 February 2—5·5, and Radcliffe Obs., 1872 March 9—6·0.

It does not occur in the *Uranometria*, but is B.A.C. 1924, and there very properly removed from Camelopardus, to which it could only have been originally assigned by a mistake. It belongs to Auriga, though it is hardly, as the Bedford Cycle tells us, "in the Waggoner's eye."

THE DOUBLE STAR Σ 2120.—M. Camille Flammarion sends us some remarks on this object, to which allusion was made in NATURE, vol. xi. p. 147. Identifying it with No. 89 of Sir W. Herschel's Class III., M. Flammarion thinks the early observation tends to establish the binary character of the star, notwithstanding the measures from 1829 to 1873 may be represented by rectilinear motion. We shall revert to this subject next week.

THE MINOR PLANETS.—The elements of No. 148 have been calculated by M. Bossert and Herr V. Knorre; the orbit is one of the most inclined to the ecliptic (26°).—No. 136, Austria, was recovered at the Observatory of Berlin on the 6th of the present month. Dike and Camilla, with one or two others, are still adrift.

THE AUGUST METEORS.—As previously stated, the systematic course of observation of the meteors of the August period, organised by the French Scientific Association, has this year been attended with considerable success, the atmospheric conditions on the nights of the 9th, 10th, and 11th having been as favourable as possible at many of the stations. The greatest number was observed during the night between the 10th and 11th, but this number varies much in the different accounts so far published by M. Leverrier. The Lisbon observers would appear to have recorded the greatest number, 1,227 meteors having been noted between 10h. and 15h. 25m., when the sky clouded. A table of more than forty tracks, exactly noted, appears in the Paris "Bulletin International" of Sept. 23, the co-ordinates of the points of commencement and extinction being expressed in right ascension and declination, with the corresponding mean times. At Avignon, on the same night, 858 meteors were recorded between 8h. 35m. and 15h. 40m. At Bordeaux M. Lespiault remarked that four-fifths of the meteors seen were Perseids, generally very small, though in a few cases they had considerable brightness and left trains. At Dijon, on a mean of the three nights' observations, the radiant was fixed approximately in R.A. 37° , and polar distance 45° , and in addition to this point, two secondary radiants were detected, one in R.A. $320^\circ\cdot4$, N.P.D. $91^\circ\cdot8$, and the other in R.A. $331^\circ\cdot0$, and N.P.D. $90^\circ\cdot0$. With respect to these it is remarked that although, by the means, these co-ordinates appeared to be confused together, yet for each night the points of radiation were very distinct, the meteors of the first group appearing to be directed towards the second radiant, and those of the second group towards the first. At Rouen, 500 meteor-tracks were entered upon the charts, the invariable direction being from Perseus. At the Observatory of Palermo, Prof. Tacchini and M. Delisa made numerous determinations of the position of the radiant from August 9-12 inclusive, the mean of the whole being in R.A. 2h. 50m.9, N.P.D. $36^\circ\ 51'$, but when the points are laid down on a chart it is seen that they are comprised in a very narrow ellipse, a circumstance to which Prof. Tacchini has already drawn attention.

M. Wolf, in reporting the results of this year's observations, considers that the phenomenon advances rapidly

towards a very brilliant maximum; the next year will enable us to judge if this maximum has been attained, and it may then be possible, he thinks, to determine the period of revolution of a swarm of meteors, which, though now extended far along the orbit, still presents a very marked region of condensation. On the contrary, M. Wolf observes, the November shower has so nearly ceased, passing now almost unperceived, that it may be unnecessary to call upon observers, who have previously co-operated in this class of observations, to expose themselves again to the possible severity of the nights at that season.

THE CLINICAL LABORATORIES ANNEXED TO THE PARIS HOSPITALS

THE first and typical clinical laboratory was created at the Hôtel-Dieu, by private exertions, a very few months after the time when blood had been running so freely on the pavement of the great city. It was organised at the expense of two doctors, who had shared the disappointments and dangers of those troubled times.

Dr. Liouville, a nephew of the celebrated academician who edited for so many years the *Annals of Mathematics*, having learned by his travels, before the Franco-German war, that Prussia and other German powers had established special laboratories at Berlin and other large cities for promoting physiological researches in the Universities, resolved to introduce establishments of that description in his native land, but under a different system. He laid his ideas before Dr. Behier, one of the most popular professors of the Faculty who adhered to the scheme, and lent all his influence and patronage to bring physical and chemical instruments to the very bedside of the patients at the hospitals.

The intention of these two distinguished physicians was not only to open an institution where physiological science might be promoted as it is at Berlin and Vienna, but to place under the hands of practitioners ready means for enlarging the degree of accuracy of their diagnoses. At a moment's notice an able microscopist armed with a powerful instrument is to answer any question put for ascertaining the composition of humours, the nature of abnormal secretions, &c. A competent chemist, well acquainted with the properties of reagents, is ready to make an analysis of blood, of virus, of medicaments, of urine, of *excreta*, suspected poisonous matters, &c. The use of the spectroscope was not so general at the time as to call for the service of a spectroscopist, but the utility of the speciality even then was made apparent to MM. Behier and Liouville.

These operations can be done daily for the instruction of the students following the daily practice of the hospital.

When the patient dies, his autopsy being carefully made, it can be shown whether the diagnosis was true, or whether the fatal result was due to some uncontrollable circumstance. The unhappy inmate whom science and humanity were powerless to save, is turned into an object of instruction, so that human knowledge may be enlarged and other sufferers cured under similar circumstances. The laboratory was also open from the time of its infancy to foreign men of science or to practitioners wishing to investigate any points connected with their patient.

To the Hôtel-Dieu Laboratory was annexed a "chenil," where a number of rabbits and the like are constantly bred and kept in an excellent state of health. These animals are destined to be employed in testing the efficacy of new medicines to be tried, if proved innocuous, on the patients. In cases of poisoning, the localisation of toxic substances is ascertained, as well as the symptoms of death, and in some cases antidotes are administered for testing their restorative power. They may be considered as living instruments for exploring and extending scientifically the scope of *Pharmacology*.